REMARKS

Following is an amended version of claim 1, which the applicants believe corrects all patentable subject matter and indefiniteness problems identified by the examiner in the office action.

1. *(currently amended)* In a series of seismic data processing steps to produce a seismic image of a subsurface region from ~~A method for use in seismic data processing to control the wavelet phase spectrum of~~ seismic data collected using a seismic source with a known signature wavelet ~~and at least one receiver~~, wherein at least one processing step assumes a particular phase property for input data, a phase control ~~said~~ method comprising ~~the steps of~~:

(a) using the source signature to design a first phase-control filter to limit wavelet phase spectrum consistent with said phase assumption or assumptions ~~inherent in at least one subsequent processing step, having first processed the source signature with any processing steps previously applied to the seismic data~~;

(b) applying the first phase-control filter to the seismic data before said ~~subsequent~~ at least one processing step[[s]]; ~~and~~

wherein before use in (a), the source signature is first processed with any processing steps applied to the seismic data before said first phase-control filter is applied in (b);

(c) after applying the first phase-control filter in (b), performing all subsequent processing steps on the phase-controlled seismic data, thereby transforming the seismic data into a version more representative of the subsurface region; and

(d) imaging physical structure of the subsurface region using the transformed seismic data.

All changes to claim 1 are believed to be supported by the original claim 1 and by paragraph 3 of the application, which states among other things that the seismic image is the final seismic processing product. As amended, it is believed that the subject matter of claim 1 clearly meets the transformation prong of the "machine or transformation" subject matter test announced in *Bilski* (currently being appealed), as further interpreted by the BPAI in the *Ex parte Srinivas Gutta* decision decided on

January 15, 2009 (Appeal 2008-3000). The latter decision held that a method that transforms data from a first form into a second form satisfies the Bilski test if the transformed data "represent physical and tangible objects." The subject matter of claim 1 is transformed seismic data that represent subsurface reflecting interfaces. These interfaces, for example the boundary between a shale layer and a sand layer, are clearly physical and tangible objects. In contrast, the transformed data in *Gutta* represented "user selection histories, an intangible," and the claimed invention in *Bilski* was a method of hedging risk in commodities trading, clearly another intangible with no associated physical object.

The clarity problems in claim 1 are likewise believed to be addressed by the amendments.

Claim 3 is amended to correct the clarity problems identified in the office action:

3. *(currently amended)* The method of claim 1, wherein said series of seismic data processing steps ~~subsequent processing~~ concludes with a second phase-control filtering of the seismic data~~, said second phase control filter being designed in steps comprising applying the first phase-control filter to the source signature from which it was designed, then processing the filtered source signature with said all subsequent processing steps up to the second phase-control filtering, and then using the resulting source signature to design a second phase-control filter to limit wavelet phase consistent with post-processing needs~~.

Claim 5 is amended as follows to be consistent with changed wording in claim 1 and to correct the clarity problem identified in the office action:

5. *(currently amended)* The method of claim 1, wherein said at least one ~~subsequent~~ processing step that assumes a particular phase property comprises ~~the steps of~~ receiver-consistent deconvolution and predictive deconvolution.

New claim 6 is added to re-present subject matter from original claim 3, but in clearer form:

6. *(new)* The method of claim 3, wherein said second phase-control filter is designed by a method comprising applying the first phase-control filter to the source signature from which it was designed, then processing the filtered source signature

with said all subsequent processing steps except the final step where the second phase-control filter will be applied, and then using the resulting source signature to design a second phase-control filter to limit wavelet phase consistent with post-processing needs.

It is believed that the amendments eliminate any indefiniteness problems, primarily by eliminating all ambiguity that might have affected the phrase "all subsequent processing steps." That phrase is now defined in claim 1, step (c), where it clearly means all steps in the "series of seismic data processing steps" occurring after the first phase-control filter is applied. Thus in claim 6, when the phrase "said all subsequent processing steps" is used, it has an unambiguous meaning. Also, the word "steps" is now used to refer exclusively to steps in the seismic data processing and not to steps (features) in the method claims.

Novelty rejections

As stated in paragraph 10 of the present application, the method taught in the Martinez patent applies a phase-correcting filter to the seismic data after the processing, i.e. after the data has been processed by, for example, a de-convolution step that assumes minimum phase. See, for example step (e) of claim 1 and step (d) of claim 7 in Martinez, where the correcting filter is applied to "said processed reflected seismic wave" in the final step of each claim. This is referred to in the present application as post-stack correction. Attention is directed to paragraph 8 of the present application where disadvantages of post-stack phase correction are discussed. Claim 1 of the present application clearly requires in step (b) that the phase-control filter be applied before any processing step or steps that assume a particular phase property for input data. The examiner believes that Martinez describes pre-stack correction in column 3, lines 17-38. Actually, at the end of this passage, the "correcting signal" **56** has been constructed but not yet applied to the data. As the next sentence (lines 38-41) states, "Finally correcting signal **56** and processed data trace **62** are convolved together at functional block **64** to produce a final corrected vibrator data output **66**." (Emphasis added) Therefore, the correction is post-stack.